

ICI

magazine

January/February

1968



ICI

magazine

Volume 46 Number 340

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Cover

A giant red 50-tonner at Mond Division's 700-acre Tunstead Quarry near Buxton, Derbyshire. After crushing, the limestone it carries will be processed in a new 1,000,000-ton roadstone plant—biggest, most mechanised in Britain. See 'Roadstone: a new market'

Photograph: Ruan O'Lochlainn



Published by Imperial Chemical Industries Limited
Imperial Chemical House, Millbank, London SW1

Editor Francis Odle
Designers Charbonneau & Dauphinais
Printers The Kynoch Press, Birmingham



ICI in India, Pakistan and Ceylon

Main Offices

Factories

ICI Subsidiary Companies

(Some companies sell ICI exports (S), others manufacture locally (M) and some do both)

- 1 Chemicals and Fibres of India Ltd.: M - polyester fibre
- 2 ICI (India) Private Ltd.: S
- 3 ICI (Pakistan) Ltd.: S
- 4 ICI Pakistan Manufacturers Ltd.: M - soda ash
- 5 Indian Explosives Ltd.: M - explosives, detonators, safety fuse
- 6 The Alkali and Chemical Corporation of India Ltd.: M - chemicals, paints, polythene, rubber chemicals, insecticides

ICI Associated Companies

- 7 Atic Industries Ltd.: M - dyestuffs
- 8 Chemical Industries (Colombo) Ltd.: S, M - polythene pipe and film
- 9 Paintex Ltd.: M - paints



1



4



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7

In the world of pipes and processes which is the modern chemical industry, how easy it is to overlook the fundamentals on which so much still depends: minerals from the ground. Yet changes in method can make it necessary to treat these fundamental materials more as products in their own right than just means to some strictly chemical end. The processing of limestone for use in road-making, described in these pages, is a good example.

1. **BLASTING.** A series of stump holes is fired at the foot of the quarry face at Tunstead. Seen here from 1700 feet away, this operation levels off the foot of the quarry face after a major blast
2. **CRUSHING.** Down thunders limestone into the giant primary crusher. Secondary crushing breaks it up smaller as required

3. **CONVEYORS.** The limestone, when not carried in lorries (as it is from the face to the crusher), moves along from stage to stage by conveyor belts
4. **SCREENING.** After crushing, the stone is separated into eight different sizes by special screens
5. **LOADING.** Loading is as highly-mechanised as the plant process. Stone in various sizes is loaded by gravity into customers' road vehicles. Rail too is used for bulk transport

6. **DESPATCH CONTROL.** At this despatch point every outgoing vehicle's load is carefully checked, with the help of closed-circuit TV
7. **ROADMAKING.** Roadstone from Tunstead went into the making of the Wakefield and East Ardsley section of the M1

roadstone: a new market

roadstone: a new market

Against a backdrop of Pennine fields,
stone is transported by conveyor to
some of the quarry stockpiles



No material could be more basic than the limestone quarried from the Pennines near Buxton for nearly 40 years by Mond Division's Buxton Lime Group or its forerunners. It has been, and is, one of the key ingredients in the ammonia-soda process operated since 1874 at the Winnington Works in Cheshire. It is also converted into lime in the kilns at Buxton, the major uses being for steel production, building trades, agriculture, and carbide manufacture in the Division's furnaces at Runcorn.

Over the years, the growth of the Lime Group had kept pace with the increasing demand for limestone and lime by Mond Division. Not long ago, however, with the adoption of new production techniques in other parts of the Division, it became clear that internal requirements for limestone and lime were going to decline – and it was up to the Lime Group to do something about it. In their search for new outlets, they began with the manufacture of cement, which is being distributed and sold for them by the Cement Marketing Co. Ltd. Now they have gone into roadstone production, with the biggest, most highly-mechanised processing plant in the country, and are selling up to 10,000 tons a week to such customers as Ameys, John Laing, Richard Costain, and Sir Alfred McAlpine. A range of limestone products originally developed to serve the maker of industrial chemicals has been extended to meet the needs of the civil engineer and the road contractor.

About 1,000 feet up in the Pennines, three miles east of Buxton in Derbyshire's Peak District, Tunstead Quarry, main production unit of the group, covers 700 acres and has a working face $1\frac{1}{2}$ miles long. Each blast brings down 80,000–150,000 tons of rock. Huge face-shovels then scoop up the lumps of limestone into 50-ton side-tipping semi-trailers for transit to the primary crusher, a monster which can crush a four ft. cube of stone down to less than 10 inches, working at a rate of 1,500 tons an hour.

After crushing, the stone passes through the washing unit, and what is needed for the roadstone plant is further crushed, screened, and stored in bins in eight different sizes. It can then be taken from these

bins as dry stone for sale, or passed on to the two coating units. Crushing, screening, coating, mixing, drying and loading are all controlled by the very latest electronic control equipment from start to finish, while conveyors link up the whole system.

Harry Corless, general manager, Buxton Lime Group, Don Bell, Roadstone sales manager, and Arthur Brookes, quarry manager at Tunstead, have all been closely concerned with this new development. Why, we asked Harry Corless, had the 1,000,000-ton roadstone plant been built at this time to serve a new market? 'When the Group studied the possibilities of new outlets,' he explained, 'roadstone emerged as one of the best because it could take up much of the excess output of stone no longer wanted inside the Division. And one of the few activities not cut back by the Government's economic measures happened to be the road construction programme in the North-west. Twenty-five per cent of Britain's population lives within 50 miles of Buxton. Clearly there is a good market for roadstone in this area, and Tunstead is well placed to supply it.'

The market was there. The geography of distribution was extremely favourable. And the basic manufacturing pattern already existed. It only remained to replan the operations originally designed to serve the makers of industrial chemicals so that they would also satisfy the makers of roads. Even before the roadstone plant was put up, mechanisation had already been increasing productivity at the quarry. Why not mechanise further and serve a new market at the same time as the older one? The decision was taken, and the new plant is the result.

'What roadstone production and distribution do,' stresses Harry Corless, 'is to fit in extraordinarily well with the established working at Tunstead. We already need $1\frac{1}{2}$ million tons of limestone a year for the ammonia-soda process, plus another 1.1 million tons for burning to lime. All this tonnage comes from the one large quarry face, and all of it is crushed, screened, and washed anyway. When you produce a given tonnage in one size of stone, you also, whether you want to or not, produce so

many more tons in another size. And the sizes that most of the roadmakers want (from three inches across to just under one-eighth of an inch) fitted in easily with what we were already producing. This explains why we sell stone of such high chemical quality for use in roadmaking.'

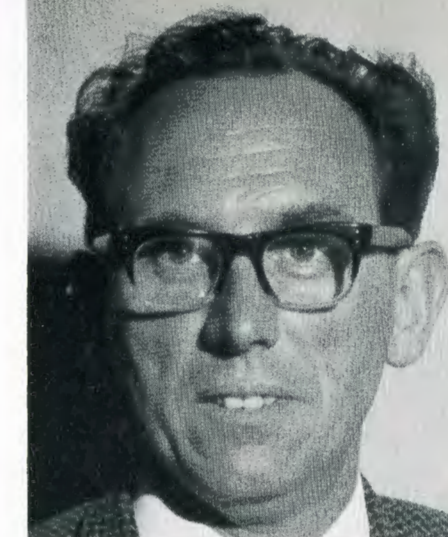
While the production of roadstone is relatively straightforward, being a largely 'physical' operation, the wide variations in demand make marketing and distribution complex enough. Apart from differing requirements in the product itself – size, quantity, coated or uncoated, degree of cleanliness – customers may want mixed orders of different sizes or grades; sudden, urgent delivery; or, again, carefully-phased delivery to fit in, for example, with the successive stages of a motorway project.

'This new plant has increased the flexibility of all our operations at Tunstead. We now have a complex group of plants, some in series and some in parallel, which readily enable a product to be made by a number of routes, and which also enable surplus stone on one section to be converted in another to a product in demand. If, therefore, we wish to meet an order for, say, 10,000 tons of two-inch roadstone, we can do so in at least five different ways. Since so many different parts of the process link up so closely, the way we decide to meet a given order affects not only the final product but also the amount of stone produced in other sizes for other uses. So we need to know very precisely the consequences of our actions, and to make the most economic use of our resources by employing highly-skilled people on our operations. Our next step is to write a computer programme taking into account the main variables.'

Mechanisation, plus intensive use of very large-capacity transport, has greatly increased overall productivity at Tunstead quarry. 'In 1965 we produced just over 3 million tons of stone. Last year it was 4.3 million tons, of which just over half a million tons will sell as roadstone. Yet our total labour force, all operations, has risen only 15 per cent for this 46 per cent rise in output. And we are making much fuller use of the



Don Bell, Manager, Roadstone Sales



Arthur Brookes, Quarry Manager

stone brought down from the face, too, because we can supply sizes for roadstone that were not previously required. For cement, our other new product, the associated clay and other less pure elements that come down in the blasting, formerly rejected, can now be used with profit. Altogether, we can now dispose of over 99 per cent of material brought down, whereas previously only 85 per cent was used.'

Designed to produce one million tons of roadstone a year, the new plant will account for 20 per cent of the quarry's total output. This scale of production is larger than that of any single plant operated by competitors. Nor is one million tons seen as the ultimate capacity: the group are sure this can be considerably increased.

The physical properties of the natural stone, the large scale of the whole operation, and the flexibility which makes possible a wide range of products, are key advantages. 'We can supply to a major customer a very large tonnage of all sizes of roadstone. This helps the customer to plan his work. It is much easier for him to rely on one source of supply. And we have another distribution advantage: from our position on the main railway line linking Derby and Manchester we can supply large tonnages of roadstone direct by rail in complete trainloads.'

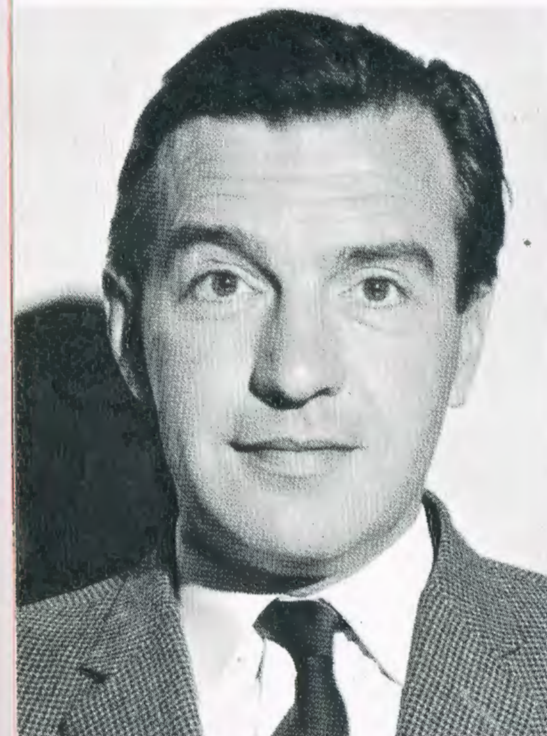
The Buxton Lime Group, with a total

workforce of 1,200, has works in Derbyshire, North Wales, Yorkshire and County Durham. Of these, 860 work at Tunstead and Buxton, with 130 more at Hindlow, near Buxton, and another 35 near Colwyn Bay. Up at Settle Limes Ltd. in Yorkshire there are 120 people, and there are 85 at the Weardale Lead Company in Durham.

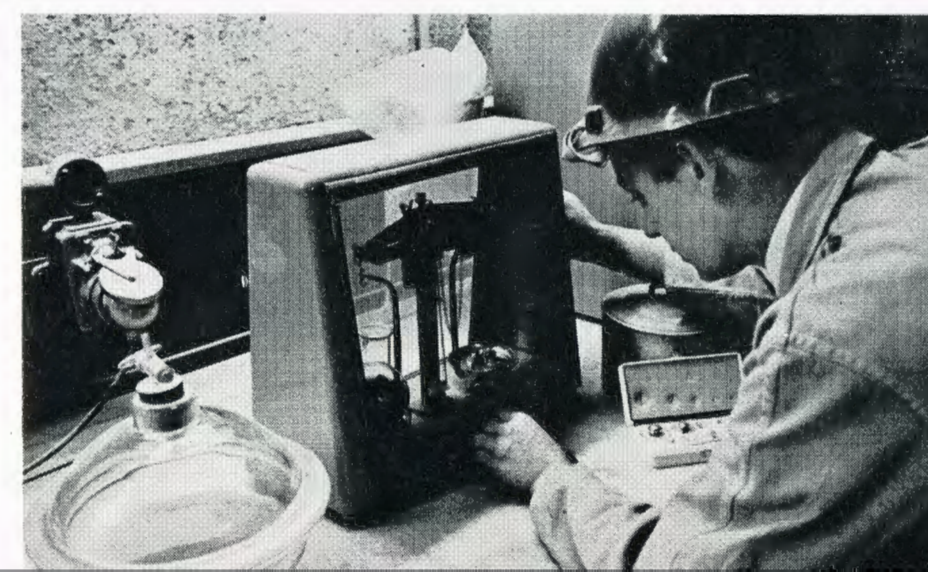
'As the technology of roadmaking and of all other end-uses for our products becomes more advanced,' concludes Harry Corless, 'more of our customers demand a product made to a very tight specification. The Group welcome this trend, and because of it we see two factors influencing how far and how fast we can grow. We have many hundreds of millions of tons of pure limestone, both at Buxton and at Settle, and we can draw on a wide range of technical skills because we are part of the Mond Division and of ICI. Our future depends on exploiting these advantages.'

In the beginning, the Lime Group (or their forerunners) concerned themselves only with the quarrying of limestone. Later they began to produce lime for chemical purposes. Today they have gone into yet further activities with the production of cement and roadstone. Nor need this be the end of the story – the story of how a traditional industry has repeatedly combined old skills with new techniques to meet the challenge of changing demands.

Harry Corless, General Manager of Mond Division's Buxton Lime Group



A control panel inside the roadstone plant at Tunstead Quarry, the most highly-mechanised and biggest in Britain



Product control in the special laboratory right inside the plant. Samples of stone are regularly scrutinised and weighed

Early in the last war, I was directed to 'proceed to Hull Docks with suitable authority' to take charge of a cargo of an important chemical from the USA, and redistribute this direct from the docks to various Royal Air Force depots all over Great Britain. Since I held a written authority to enter a restricted area like Hull Docks there was little difficulty, despite sporadic day raids by enemy bombers, in clearing these supplies according to instructions.

I was, however, a complete stranger to the town, and being comparatively young felt a little bored in the evenings. I therefore occasionally sought some form of light entertainment to while away the time.

One evening I wandered into an attractive-looking restaurant complete with dance band, found myself a table, ordered some refreshments, and sat back to await and enjoy what according to the waiter was a very excellent floor show. Now I am a Scot, and as I sat there enjoying the pleasant surroundings I started to hum an old Hebridean folk tune. Suddenly I was startled to feel an arm on my shoulder. I

looked up quickly to see a well-dressed and distinguished-looking man who was just a little tipsy.

'I haven't heard that tune for over ten years!' he exclaimed excitedly. 'You're a friend of mine, that's what you are. Come over to my party - have anything you like, anything you like.' To humour him and avoid any suggestion of a scene, I rose and went to his table. The party consisted of three other men, one of whom was a uniformed chauffeur. I raised my eyebrows on seeing a chauffeur but said nothing.

'This is a very good friend of mine, a very good friend,' muttered my self-appointed host, and everything went along nice and friendly until he began to question me.

'You don't belong to these parts,' he shot at me suddenly, 'I can tell by your accent. What are you doing in Hull?'

'I'm here on business,' I replied as levelly as I could. 'What sort of business?' he demanded quite belligerently. Again, as patiently as I could, I answered 'I'm sorry but I cannot tell you.'

My new-found friend turned purple. Neck muscles looking about to burst his collar, he shouted back: 'I know what

you are, you're a spy, you're a damned dirty spy! It's the likes of you we have to thank for the bombing of Hull and the killing of our folk. I'm going to phone the police!'

I think I must have turned pale, and I was acutely conscious of the scraping of chairs and of many faces from other tables turning in my direction.

My own temper was beginning to rise at this unjust and uncalled-for turn of events, but I tried desperately to remain calm, reasoning that many people in Hull must be hypersensitive after the merciless night bombing they had had to endure and were still enduring.

Turning to face him, I said as coolly as I could, 'You'll be making a mistake and a fool of yourself into the bargain - I hold credentials which will satisfy the police.'

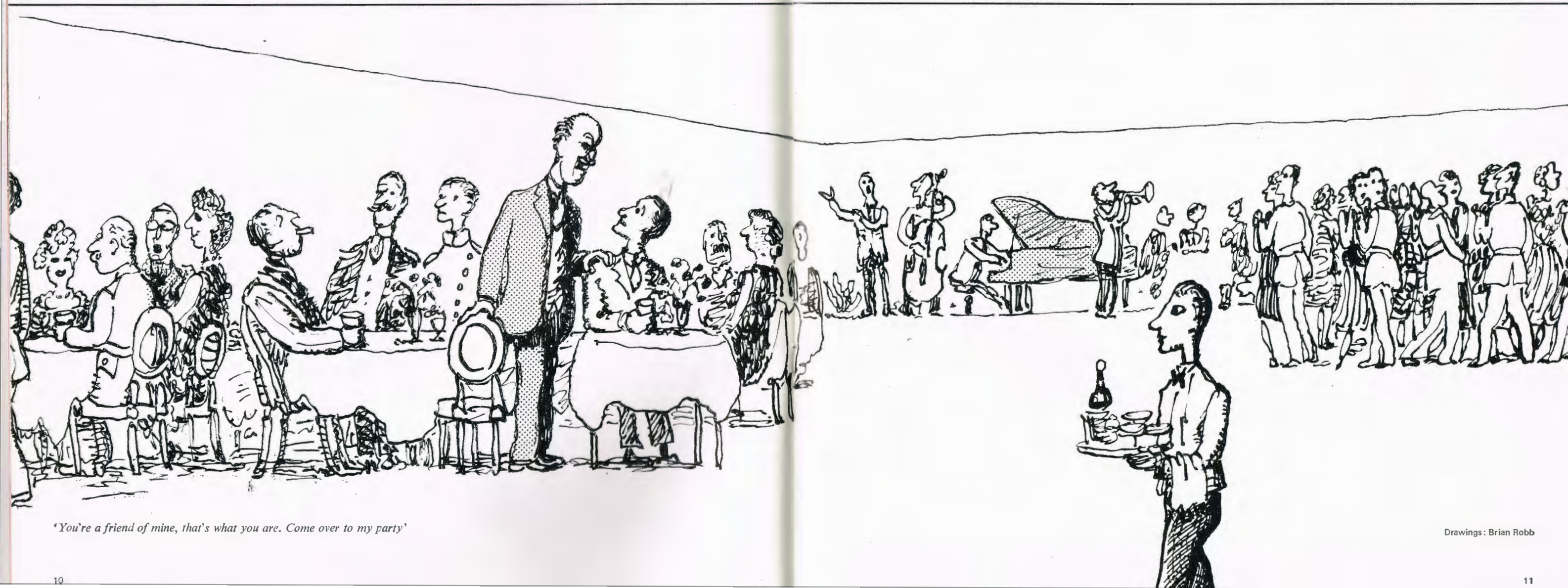
However, despite an attempt by the rest of his party to restrain him, he struggled across to the telephone. The band stopped, the manager appeared, and everything was boiling up to a climax when that terrifying spine-chilling wail was heard - the sirens signalling another night-bombing attack.



'You're a spy, you're a damned dirty spy!'

strange encounter

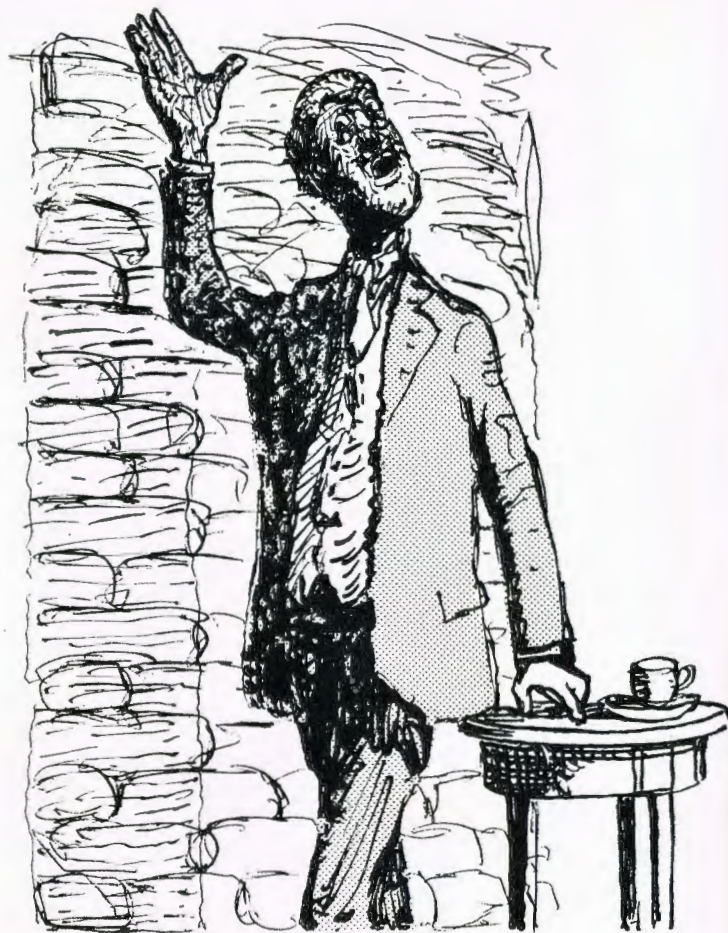
Jim Docherty



'You're a friend of mine, that's what you are. Come over to my party'

Drawings: Brian Robb

strange encounter



'All hail, Macbeth, hail to thee, Thane of Glamis!'

The place went deathly quiet for a second, only to be followed by a crescendo of noise and hubbub as everybody made for the shelters or for their appointed posts.

My spot of trouble was momentarily forgotten and I made to go, only to find that my undesirable companion was still holding on to my arm. 'Get into my car outside,' he whispered huskily, 'my chauffeur will drive us to a safe place.'

I had serious misgivings about this after my recent experience, and declined the offer. The chauffeur caught my eye and murmured to me 'Don't worry - he's O.K.'

This reassured me a little. After all, I reasoned, this is Great Britain, we don't have any of that 'cloak-and-dagger' stuff here.

On the spur of the moment I decided to chance it, but as we sped through the inky blackness of the blacked-out town, I really began to wonder if I hadn't dropped right into the middle of an Edgar Wallace thriller. I felt even more alarmed when the car, after what seemed an interminable time, drew up at a big rambling house, the door of which was opened immediately by a little silver-haired lady.

I stared in perplexity at the old lady, who smiled kindly and beckoned me downstairs to a strongly-reinforced air raid shelter, very well furnished, beneath the house. She then brought coffee and sandwiches on a tray and handed them round with every air of respect. I began to pinch myself - 'This can't be real, I'll wake up in a minute' - yet all the time I knew it was real.

My strange companion interrupted my thoughts. 'Mother,' he broke out, 'I have brought you a visitor, quite a special visitor. He is not from these parts, so look after him well.'

There was something about the tone of the remark I did not like; I ought to have been impressed, but I could feel the

hairs on the back of my neck beginning to bristle, while a warning voice inside me said 'Be on your guard. Keep your wits about you.' I tried hard to hide my sense of alarm, and turned to my host to make what I hoped was an appropriately casual remark when to my utter astonishment he looked me straight in the face, struck a majestic pose and in a deep, sonorous voice shouted out:

'All hail, Macbeth, hail to thee, Thane of Glamis.'

Then followed along the whole of the witches scene from *Macbeth*. The old lady smiled her approval.

What folly, I wondered, had made me come to this mad-house? The reason for my presence in Hull had not been broached so far, but I knew it would surely come.

'You are well up in your Shakespeare,' I said; 'I recognise the witches scene from *Macbeth*.'

'Yes,' he replied, 'I am very fond of Shakespeare, he was a genius; but you haven't told me what you are doing in Hull.'

Although I had been expecting it, I was still taken by surprise at the smooth way the conversation was turned in my direction. However, I mustered enough composure to say: 'I am sorry, but I have already told you the nature of my business here is confidential and I can't say anything more about it. I promise you that you have nothing to worry about, and I don't understand your unusual curiosity.'

Now I've done it, I thought, and waited. My host appeared to take no notice, but once more sallied into Shakespeare:

'Let music sound while he doth make his choice;
Then if he lose, he makes a swan-like end,
Fading in music . . .'

Dimly I remembered that this was from the casket scene in the *Merchant of Venice*. With visions of a swan-like end for

myself, I began to think I would never see ICI again or dear old Hexagon House. All that was wanted, I now felt, was the music - harp music.

I began to wonder what sort of man I was dealing with. He was obviously well educated and a lover of Shakespeare, and boasted a chauffeur in time of war, which in itself was unusual. My ruminations were soon cut short again:

'Yes,' he said, 'Shakespeare is truly wonderful. It must have been something fairly important that brought you to Hull in the middle of a war.' Again he was so quick that without thinking I answered, 'Well, not important to me. Let's say it is important to the country.'

This reply seemed to please him, for turning to the old lady he said, 'Mother, give our visitor some more coffee.'

I was glad of the coffee, it gave me a chance to think. But not for long. My Shakespearean friend rambled on:

'Let not our babbling dreams affright our souls;
Conscience is but a word that cowards use,
Devis'd at first to keep the strong in awe,
Our strong arms be our conscience, swords our law.'

He had me beaten this time, but then I'm no great student of Shakespeare. He seemed to read my thoughts. 'You ought to study Shakespeare more. It will enrich you, yet chasten you. Tell me, does your business in Hull by any chance take you near the docks?'

I remained silent, uncomfortable under the solemn glances of the old lady and the others.

'Come, now,' said my questioner, 'there is no need to be apprehensive. You've nothing to be afraid of: you can trust everyone here.'

I was in a terrible quandary. My friend now seemed anything but tipsy, and strangely enough I found myself beginning to like him.

'You mentioned credentials,' he said, 'Let me see them.'

'You have no authority or right to ask me that,' I replied.

He seemed in no way astonished at this, and I was wondering 'what next?' when that shrieking continuous wail of the sirens signalling the 'All Clear' was heard.

'Now will you please let me go,' I said. 'I have to be up early in the morning, and it is 2 a.m. now.'

'Look,' he answered, 'I have a little more authority than you think. Let me see your papers, and my chauffeur will take you back to your hotel immediately.'

I was in a terrible dilemma. Should I chance it again? I decided to do so. He looked through my papers in expert fashion. 'H'm' he muttered, 'the Docks - I thought so. My chauffeur is ready now. Here is my telephone number. Give me a ring tomorrow.'

Once again, still rather dazed by my strange experience, I found myself back in the car, driving through the still pitch-black streets and going I knew not where.

At last the car drew up at a big grey stone structure. 'This is not my hotel,' I said to myself, but the bad light deceived me. It was in fact my hotel, and with a very turbulent mind I tried to find some much-needed sleep.

I awoke in the morning after a very troubled night, not certain whether I had imagined the whole thing or not. A scrap of paper with a telephone number on it convinced me I had not. After breakfast and before going to the docks again for the day, I thought that I would try this mysterious telephone number.

'I wonder who he is,' I mused. 'Is he a spy himself or a member of M.I.5?' I gave the telephone number to the operator and waited impatiently. Getting no reply, I joggled the receiver up and down in irritation. 'Operator,' I said, 'what about that call?' 'Sorry, sir,' she replied, 'that number is unobtainable.'

I tried again the following day and the day after that, but the only answer I ever got was 'I am sorry, sir, that number is unobtainable.'



Prince's Dock, Hull, with the City Hall left and British Transport Dock offices right

devaluation: the pros and cons for ICI

For a company as large and diverse in its interests as ICI, the devaluation of the £ by 14.3% will be a mixed blessing. One recent result is the raising of UK fertilizer prices because their raw materials will now cost the Company more to buy from abroad. Some of the factors to be reckoned with—positive and negative—in the coming year are here discussed by Mr Maurice Hodgson, General Manager—Company Planning.

Many of us will by now have read quite a few articles and heard quite a number of broadcasts about the impact of devaluation on the British economy. Perhaps not so many of us will be much the wiser. While some of these articles are rather vague about where the balance of advantage lies, others concentrate on the less exacting task of allocating responsibility for the difficulties which forced the country to devalue. Unfortunately, the question is complex—as complex for the company as it is for the country. But by thinking hard about a few key facts and figures we should be able to understand the essentials.

The story begins simply enough. The pound sterling is now worth 2.40 dollars instead of 2.80. British exports should therefore increase because they are now cheaper, in the ratio of 240 to 280, and therefore more easily able to compete. Imports, on the other hand, should fall, because they now become more expensive, in the ratio of 280 to 240, and so are less competitive with domestic production.

But it is the *revenue* from exports, and the *expenditure* on imports, which affect the balance of payments, and here the complications begin. Many imports, for example of food and raw materials, cannot be replaced by home production, and these will in future cost everyone in Britain one-sixth more. Furthermore, if we as a trading nation reduce the price we charge overseas customers for our exports in terms of their own currencies, we will receive one-seventh (or 14.3%) less for our goods (assuming these customers have not also devalued). The *immediate* effect of devaluation on the balance

of payments is therefore unfavourable. Considerable increase in the *volume* of British exports, and reduction in the *volume* of our imports, are necessary to restore the position, let alone improve it. When we consider the probable effects of devaluation on ICI, we find close parallels. Let us consider the favourable factors first.

In the home market many ICI products have to compete with imports, which will now either be more expensive or, if their prices are not increased, less rewarding to the overseas manufacturer. There will certainly be opportunities for us to increase our home sales by substituting ICI products—e.g. synthetic fibres made in Britain instead of wool imported from abroad—but to what extent we can do this is not easy to tell. Overseas manufacturers will often accept very low prices just to keep their plants running to capacity, and some of them will no doubt be willing and able to accept the lower prices they will be getting. Because competitive imports will now tend to be more expensive, the downward trend of prices for ICI products which has persisted for many years will probably ease to some extent. It is the continuous erosion of prices which, more than anything else, has prevented the company's profits from showing a more impressive response to the enormous expenditure on large new plants during the past few years.

There will also be favourable repercussions on exports, but here devaluation has confronted all exporters with a dilemma. Take the hypothetical example of ICI product X, which we sold for \$280 a ton in the USA before devaluation, and for



'The balance should be favourable, but how favourable depends on how far we can step up output to take advantage of improved sales opportunities; on the skill with which we make commercial judgments on export prices; and on how far we counteract cost increases by more efficient working.'

which we therefore used to receive £100. Should we now (a) continue to sell for \$280 a ton, and therefore receive £116⅔ in (devalued) sterling? or (b) reduce the price to \$240 a ton and continue to receive £100? (c) do something in between?

If we choose course (a) we will not, it could be argued, reap the benefits of devaluation in the form of increased exports. But if we choose course (b) we would sacrifice £16⅔ of income and £16⅔ of foreign currency to the national economy. Some have seen a potential conflict here between the interests of the company and those of the country, but they are in fact very similar. Both these interests are best served by winning the maximum *revenue* from the sale of product X. The decision whether course (a), course (b) or course (c) will best meet this objective must be left for careful and expert judgment, product by product and market by market. The skill with which such judgments are made will decide how much benefit the company—and the country—can secure by getting the highest possible revenue.

As the *Financial Times* has pointed out in a leading article on New Year's Day: 'There is no point in a company cutting prices if it does not have the spare capacity available to meet a sudden jump in the demand for its products. Nor is it sensible for an exporter to cut prices if the only effect will be that all its main competitors immediately do the same. . . . In some markets competition should be on price, and devaluation should be used to make British goods cheaper. But in others the benefits of devaluation should be used to improve service or to earn higher profits in order to build more capacity.

Price is only one of many factors that determine the level of exports from either a company or a nation.'

But apart from these favourable effects on home and export sales, there are several factors for ICI on the debit side.

The company uses large quantities of imported raw materials such as petroleum products, sulphur, phosphate rock and potash, all of which are now more expensive. Moreover, other British companies, including those which supply ICI, also use imported raw materials and will want to pass on their increased costs to us in the form of increased prices. Also on the debit side are increased transport costs arising from higher freight charges where these must be paid in foreign currency, and the changes in effective taxation rates which the Government introduced at the time of devaluation. These are the loss of export rebates, the loss of the Selective Employment Tax rebate, and the increase from 40 per cent to 42½ per cent in Corporation Tax. The cost to ICI of all these adverse effects is estimated at about £20,000,000 in a full year.

What then is the most likely overall result for ICI? No doubt sales will be higher in 1968 than they would have been, at home and abroad—both by value and in volume. But what of profits? We are left with a difference between a considerable increase in sales income and a substantial increase in costs. The balance should be favourable, but how favourable depends on how far we can step up output to take advantage of improved sales opportunities; on the skill with which we make commercial judgments on export prices; and how far we counteract cost increases by more efficient working.

people · projects · products

In on the finish – with Concorde

When Concorde rolled out for her official public debut at Toulouse airport last month, two members of ICI's Paints Division, Mr. Jack Vincent and Mr. Brian Elliot, took a professional interest in the event. Only a few weeks earlier, as members of the Division's Technical Service and Development Department, they had been in Toulouse themselves, supervising the exterior painting of the French prototype at the Sud Aviation works. Painting had to take place at night when other work had stopped, and it took almost four weeks to complete the aircraft. The ICI men and a representative from Société Française Duco, ICI's paint associates in France, spent three nights in Toulouse checking the application of the epoxy primer and acrylic finish. Total area covered was 1,500 square yards. Essential requirement for the exterior scheme, which is white, is that it should *stay* white, and thus reflect intense heat at temperatures up to 130°C over very long periods – which is why ICI's paint was chosen. It is already in use on the Buccaneer, the Royal Navy's strike aircraft. The paint used on the French Concorde was made to Paints Division's formulation by Société Française Duco at their Stains factory, near Paris. For the British Concorde, which should be ready for painting by Easter, the paint is being made at Stowmarket factory.



Photograph: The Observer



Farewell gift for Sir Paul

At the end of the Central Council meeting at Blackpool on November 17 Sir Paul Chambers, ICI Chairman, was presented with a portable television set, a farewell gift from all members of Central Council, by Mr. K. O. Nilan (Wilton Works), the new chairman of the employee representatives. It was Sir Paul's last meeting before he retires in March and, thanking members for their gift, he said that although taking the chair at Central Council was hard work, he had enjoyed it. Sir Paul recalled that he had been to about 40 of the 60-odd meetings of Central Council, having attended his first in November 1947. He paid tribute to the support he had always received as Chairman from all members and said an outstanding feature of Council meetings was the way in which people from so many walks of life were prepared to put forward their views and co-operate in making Council decisions.

'MUPS' trials get under way

The first day of the New Year saw the start at three separate ICI factories of the first trials under 'MUPS' – the manpower utilisation and payment structure proposals which were agreed between ICI and the trade unions.

The trials began on January 1 at the Stowmarket works of Paints Division, which has about 700 employees, the Gloucester works of ICI Fibres Ltd., where all of the 1,800 members of the payroll (now weekly staff) are involved, and the chlorobenzene plants of Mond Division's Hillhouse works near Blackpool, where 70 men are affected. Following the start in the chlorobenzene plants it is expected that other Hillhouse employees of both Mond and Plastics Divisions will be included shortly. The hope is that the whole site, with more than 2,500 employees, will eventually be on MUPS conditions.

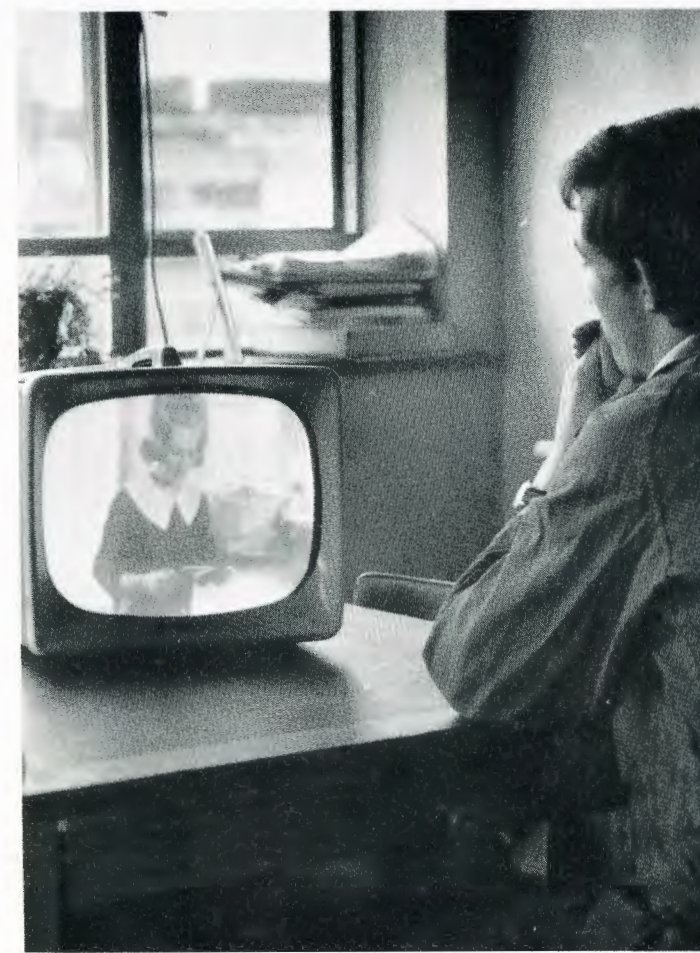
The MUPS agreement was signed by representatives of the Company and of the trade unions in October 1965. It provides for local discussions of many measures for improving productivity through changes in working practices and provides for new salary structure for shop floor employees, who will now receive an annual salary, paid weekly. Wages of employees on plants where the trials have started will increase by between £1 and £3 for a 40-hour week, depending on job grade and current earnings.

Because of the varied nature of the Company's manufacturing activities and the fact that radical changes in thinking and attitudes were required, progress has been slower than both Company and unions had hoped would be possible. However, the discussions which led to these first trials – and other talks now taking place at other works – have been thorough and constructive, and there has been a determined effort at all levels to achieve understanding and agreement. Discussions on starting trials are in progress at Dumfries (Plastics and Nobel Divisions), Severnside and Immingham (Agricultural Division), and Stevenage (British Visqueen Ltd.).

'I've got a job'

It is not every day that you can see yourself at work. But two Wilton 'Terylene' Works teenagers who did just that are messenger girl Janice Donkin and bobbin boy Ronald Upton, the stars of a BBC/TV schools documentary in the *Going to Work* series.

The film, shot at Wilton Works and in the surrounding district, was transmitted at the end of November on the national network and was estimated to have been seen by half-a-million home viewers and an unknown number in schools throughout the country. Special arrangements were made to allow Janice and Ronald – and other 'Terylene' staff featured in the documentary – to see the production. Janice and Ronald provided their own commentaries for the film, the title of which was 'I've got a Job.'



Giant reactors shipped to Tees-side

Two 75 ft. Dutch-built reactors for a new ICI petrochemical plant on Tees-side were delivered to Wilton Works last month and a third will arrive from Holland later this month. The reactors – individually the heaviest single loads brought by road into Wilton Works – were for HOC Division's 100,000-ton ethylene oxide plant and an associated glycol plant, both due on stream early in 1969. These chemicals are ingredients for the production of 'Terylene,' detergents and anti-freeze.

Built at Schiedam, near Rotterdam, the reactors, each weighing 220 tons, were loaded in Holland by floating crane on to the 2,000-ton Dutch-owned ship *Lady Jane*, an unconventional vessel which looks like a cross between a landing craft and a car ferry. At Tees Dock the reactors were towed from ship to shore through the open bows of the

Lady Jane after she had been brought nose-on to the berth. The first reactor was lifted clear of its four supporting cradles by four heavy-duty hydraulic jacks. The vessel was then turned through 90 degrees, anchors were dropped and the bow gates were opened. Next, using her own equipment, the crew winched out through the opening a massive section of the top deck of the vessel, which became a ramp between deck and dock. Two 32-wheel bogies were pushed up the ramp and under the reactor so that it could be towed to Wilton works, and the reactor was lowered, secured and towed off with only a foot or two of clearance on either side. The final stage of the journey – from the dock to Wilton – was not without its problems. The Division's biggest worry was checking the weight limits of the bridges the reactors had to cross on the way to the site. There was not a lot in hand.

Twenty-four for Mogilev

The names of twenty-four men who will form part of the commissioning team for the new £30 million polyester plant complex at Mogilev, Russia, were announced recently by the team leader, Mr. William Liddell, former deputy works manager at Wilton 'Terylene' Works. The team members will undergo special preparation, including a course in elementary Russian, and will undertake the training of about 100 key Russian staff, some of whom are due to arrive at Wilton Works shortly. Most of the team will then be going out to Russia in the summer for several months to help commission the pilot plant. The main plant start-up lies some way

ahead, starting early in 1969. Commissioning the new Russian plant presents ICI Fibres and its partners in the Polyspinners Consortium with an unusual challenge. 'First of all,' says Mr. Liddell, 'you have the very large scale of the project – the site is roughly the size of Hyde Park. When in full production it will have a fibres capacity of 50,000 tons a year, which is about as large as ICI's UK 'Terylene' production, and a work force of 7,000 people. But it's not just a question of size. The standards of performance and quality set by the contract are very high too, and the timetable is a tight one. Combine all these requirements, add the barrier of language, and you will appreciate something of the job ahead.'

New Year Honours

Six ICI names appeared in the New Year Honours List. Mr. Norman Freeman, managing director of Imperial Chemicals Insurance Ltd., and Mr. Sam Howard, former chairman of Pharmaceuticals Division, both receive the CBE; Dr. Geoffrey Watts Padwick, overseas director of Plant Protection Ltd. and

Dr. George Trubridge, joint deputy manager of the Summerfield Research Station of Imperial Metal Industries (Kynoch) Ltd., get the OBE; Mr. Peter Hall, Head Office Public Relations Department, gets the OBE (Military Division); Dr. Richard Young, licensing group manager, Engineering Department (Agricultural Division), receives the MBE.



Mr. Freeman

Dr. Watts Padwick



Mr. Howard

Dr. Young



Father and son's 98 years' service

What is believed to be an all-time ICI record came to light at a recent long service award ceremony held by Dyestuffs Division at Manchester. Among the 75 Division staff presented with awards by Sir Peter Allen, ICI Chairman-elect, was Mr. Robert Curry of the Division Engineering Department. He received a 40-year award and chose a silver tea service, as his gift from the Company. This now stands on the sideboard at his home at Cheadle Hulme, Cheshire, alongside the clock which his father, the late Mr. Robert Nicholas Curry, received for 50 years' service with ICI and its predecessors. Mr. Curry

senior actually completed 58 years with the Company. He stayed on at Billingham after reaching retirement age because of the manpower shortage during the last war. Speaking at the long service dinner, Sir Peter said that when looking through the biographical notes about the people who were to receive awards, he had been struck by the variety of their spare-time interests. Golf, football, youth club work, scouting, amateur drama and church work were among the more conventional activities listed. But there were also a former Manchester soccer player, a breeder of budgerigars, a composer of brass-band music, a part-time policeman and a former King's bugler.

Soda fights foot and mouth

Soda crystals from Mond Division have played an important part in the fight against foot and mouth disease. In an attempt to prevent it from spreading, mats of straw impregnated with a solution of crystals were spread across roads and farm entrances in some areas to disinfect all vehicle wheels and pedestrians' footwear as they passed over them. Soda crystal solution is acknowledged as providing the most effective disinfectant against foot and mouth disease, and Mond Division's Technical Service staff were kept busy last month answering inquiries from farmers and others on the best methods of applying it.

Although foot and mouth disease reached within a few miles of Alderley Park, the Cheshire headquarters of Pharmaceuticals Division, the farm there remains free from infection as we go to press. While the outbreak appears now to have passed its peak, precautionary measures are being enforced as stringently as ever. For, warns Dr. Spinks, a Division deputy chairman and research director, if the farm stock did have to be slaughtered, the Division's work could be severely damaged and important research into animal health and nutrition could be delayed by as much as six months. Work has already been limited to some degree by shortage of new stock, but the position is not yet serious.

people in print



Nigel Cattlin is head of the photographic unit at PPL's Jealott's Hill Research Station in Berkshire. He joined ICI from school in 1963 as a laboratory assistant and was promoted to his present job last year. He also makes a hobby of photography, specialising in natural history and motor-racing. So far he has found 35 of the 49 British varieties of orchid, among them many rare ones. His chances of seeing – and photographing – the remaining 14 British orchids are limited, he says. They are mainly found in the North of England, Scotland and Ireland and are in bloom for only about a fortnight, between April and September, depending on the species. He would be grateful to any readers who can let him have records of species of British orchid they have seen, where they were found and the numbers present.



Jim Docherty, whose odd tale of a wartime visit to Hull appears on page 10, retired last year after more than forty years' service. In 1921 he joined the Research Department of Scottish Dyes Ltd., a forerunner of the Dye-

stuffs Division, at Grangemouth and later became superintendent of the sales warehouse there. In August 1939 he was sent south to open and organise a wartime emergency stocking centre in Oldham, Lancashire, and two years later he moved to Manchester to take charge of the sales warehouse at Blackley Works. From 1959 until he retired last year he was superintendent of the Division's Sample Dispatch Centre.



James Mackay is an assistant manager of the Central Distribution Department at Millbank. He joined the then General Chemicals Division at Runcorn in 1957 as an engineer and worked in the Division's Engineering Department and on the calcium carbide plants at Hillhouse and Castner-Kellner works before moving to the former Shipping Department at Liverpool in 1962. He transferred to the Central Distribution Department at Millbank in 1965 to work on distribution development and became an assistant manager last April in charge of liner shipping as well. He has made a special study of the development of container transport and visited the pioneer American companies in this field – Sea-Land Inc. at New York and the Matson Line in San Francisco – to get to know their techniques at first hand. Before joining ICI he was a regular soldier, serving from 1943 to 1957 in the Royal Engineers in the British and Indian Armies in Europe and Far East. While in the Army he took a degree in mechanical science at Cambridge.

It is not enough for factories to make products and for salesmen to travel the world persuading customers to buy them. A third force – distribution – has to move the goods away from factories and across the intervening space to the customers before they will part with their money. In Company terms, however, it is concerned with more than just the physical link between production and sales: ICI distribution takes over when a customer places an order and is concerned with everything that happens after that until he finally has the right goods to hand, at the right place and time. This is the distribution cycle. It may be complete in a few hours if the customer lives just down the road. It can often take several weeks, even months, if he is thousands of miles away on the other side of the world.

delivering the goods

James Mackay



delivering the goods

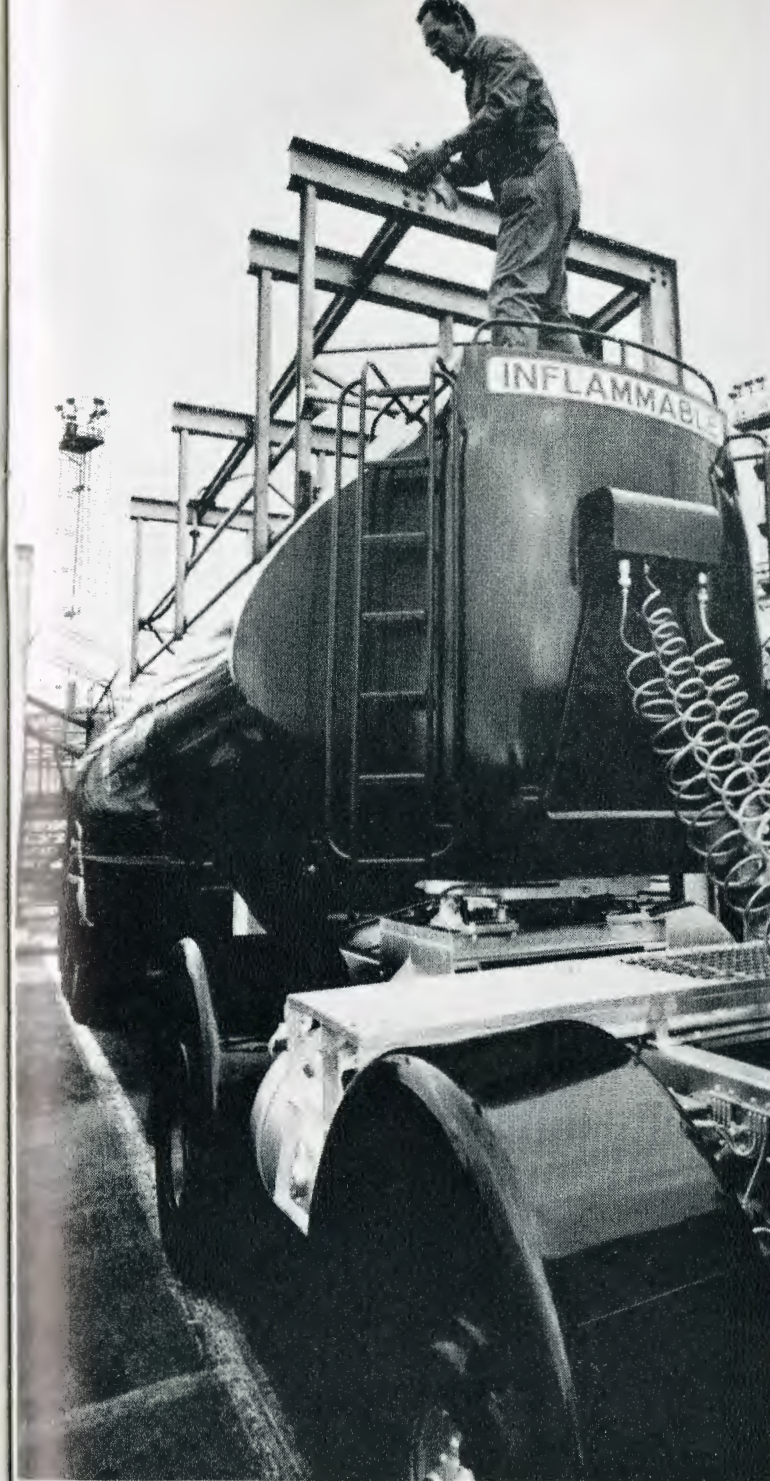
Distribution never stops. Transport by road, rail, sea and air is on the move day and night to deliver goods to ICI's customers in all parts of the world. Right: road vehicles being loaded by night in the Paints Division's warehouse at Slough for delivery next day

About 10 million tons of raw materials and finished products move by rail each year: ICI's annual account with British Railways exceeds £8 million. Bob Smith of Agricultural Division (centre, right) is seen at the controls of a 400 h.p. Janus diesel-electric locomotive – one of 55 shunting locos operated by ICI in Britain – in the main departure sidings at Billingham factory

Integration of transport is important. Company trains run between specific points within the UK, providing ICI with the benefit of cheaper transport for large quantities. Bottom, right: To this terminal depot in London a special ICI train brings down packaged goods and bulk liquids overnight from the North. Local delivery to ICI customers in the London area is by road

The greater part of ICI's road vehicle deliveries in Great Britain are made by road haulage contractors. For certain difficult products, however, ICI prefers to use its own vehicles and drivers – in a year the Company's 400 long-distance drivers can cover up to 20 million miles. Opposite page, above: Harold Armes loads one of ICI's newest road tankers at Wilton Works

To carry chemicals all over the world – or to bring in raw materials – the ICI Group uses more and more tanker ships. ICI at present moves 900,000 tons a year of bulk liquids in and out, involving 1,500 separate charters. Opposite page, below: M.V. 'Pass of Melfort' unloads feedstock for HOC Division at Billingham oil jetty



The cycle begins when a customer places an order. This is passed back to the distribution office, and then questions, answers and decisions must rapidly follow. Is the material available now straight off the production line? If not, when will it become available? Is there a stock in a warehouse somewhere en route, and would it be better to draw from that instead? What packaging should be used for the order? How is the material to be moved to the customer – by what sort of transport and over which route? When will it be ready for collection and when must it be delivered – and what will all this cost? Since few orders can be given completely routine treatment, most of the problems have to be dealt with from scratch. ICI distribution staff in the Divisions at home handle some two million orders for fifteen million tons of products every year, or about eight thousand orders in a working day. It needs a high degree of skill and organisation to operate on this scale.

Distribution in ICI is large in its own right by anyone's standards, with a total expenditure in the United Kingdom alone running above fifty million pounds each year. It employs around five thousand people at home in all fields: office staff from store clerks to accountants; warehousemen; transport controllers; and drivers of road vehicles, fork-lift trucks and locomotives. Abroad, there are distribution organisations in Europe and other markets to handle the output from local ICI plants, as well as material supplied from this country. Persistent efforts are made to hold distribution costs down to help keep our products competitive, although economies should never be made at the expense of the service the customer requires. Those who are well served come back for more. Even the best goods at the best prices will not be enough to win customers against world competition if the distribution service offered by ICI is not of the highest quality. It has to be continually remembered that the distribution cycle starts and finishes with the customer. The whole process must be aimed in his direction all the time – to meet his real needs, and sometimes even his whims and fancies. It follows that ICI distribution has to be closely tied in with the marketing effort – not only for the obvious reason that distribution represents a substantial cost in marketing, but more importantly, because the customer is in effect sold both the product and the delivery conditions in a single deal.

The techniques of distribution are kept under continual review. On the administrative side, electronic data processing machines are on their way in to handle a lot of the day-to-day work and in time they will intervene at every point in the cycle. The idea is that the machine should receive a customer's order from anywhere in the world, and then control all the intermediate stages leading up to the final delivery of the goods – at the same time printing off the necessary documents and instructions as it goes along. There are many problems to be overcome before this ideal is achieved in practice. There is equally no doubt that the fantastic speed and accuracy of these machines will in the long run greatly reduce the cost and improve the service of ICI distribution.

ICI products have to be suitably clothed on their way to market, and hundreds of millions of packages are needed every year. Great improvements have taken place over recent

delivering the goods

The 'container revolution' is based on the rapid transfer of standard boxes between various means of transport. This Cunard Line container left the factory by road, was transferred to rail for movement to the docks, and will go on by sea to New York. Container transport is basically cheaper in terms of door-to-door cost, and gives faster transits with little or no damage to the contents. Global investment by the transport industry is likely to reach £1,000 million during the next few years



Air transport is increasing all the time. At present about 15,000 ICI consignments a year go out all over the world by air. Right: A BEA freighter is being loaded up at night

Delivering material in 'mini-bulk' containers reduces costs and improves efficiency. Opposite: Plasbins, developed by Plastics Division and made from their own 'Alkathene,' are loaded on to a lorry ready for delivery to the customer



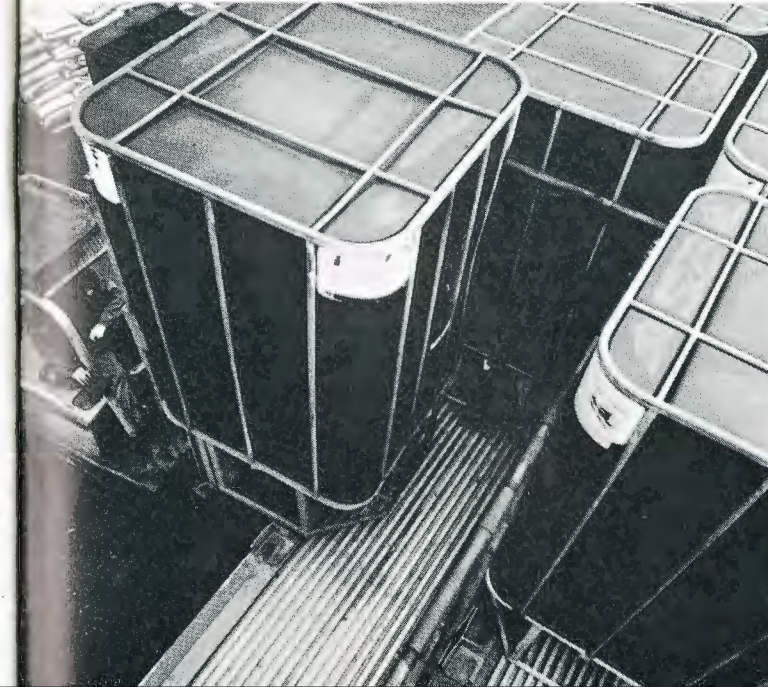
Photographs: Michael Taylor and Cunard Line

years in performance, cost and appearance. Good-looking packages sell better, as every supermarket manager knows, and this is true even with hard-bitten industrial customers. ICI also has an obvious interest in the packaging industry as a whole to provide an outlet for its own products – sacks made from plastic film, for example, in place of the traditional paper. In this particular case there was a double interest – these sacks were at the same time developed as a package for a variety of ICI products made at home and overseas.

Transport accounts for well over half the total cost of ICI distribution, and so developments in transport methods tend to be the most significant of all. Progress is, however, often complicated by the fact that ICI has to rely almost wholly on outside organisations beyond our direct control for road, rail, sea and air services. One important trend is away from package delivery and towards supplying customers in bulk. Movement in bulk not only saves the cost of packaging – faster loading and discharge of the vehicle or vessel leads to quicker turnround, and lower freight charges result. The amount and variety of product moved in bulk to customers at home and overseas is already large and is increasing steadily. In the last ten years, for example, world-wide export movements of bulk liquid cargoes in special chemical tanker ships have been developed from small beginnings to a current total of about half a million tons each year. As soon as a trickle looks like becoming a flood, distribution men fetch out their slide rules to calculate the point at which it will pay to change from package delivery to bulk. Then they plan and negotiate for the special facilities required – storage tanks, loading and discharge equipment at either end, and bulk vehicles for the movement in between.

For the traffic that must remain in packages, great changes are coming about as a result of the 'container revolution.' This started some years ago on the short sea routes between Britain and Europe, where ICI was quick to take advantage of the services offered, but it had only a limited impact across the longer distances. Now it seems certain to make a profound impression on world-wide movement and distribution patterns, with a global investment by the transport industry of about £1000 million over the next few years. The container concept is simple. All package cargo – sacks, drums, cartons – is loaded into large standard boxes – the containers – which can then be moved over any system, road, rail, sea or air, to their destination. Container movements are inherently cheaper in terms of door-to-door cost, and give faster transits with little or no damage to the contents. Beyond Europe, ICI is already using containers for the direct shipment of products from plants at Wilton, Dumfries and Runcorn to customers in the USA, trial container loads have moved from Wilton to Melbourne in Australia, and other routes are being looked at so that we can open them up as soon as the equipment becomes available.

In every branch of distribution – administration, packaging, materials handling, warehousing, transport, shipping – new ideas are emerging. All these have to be sifted, developed, and finally submitted to commercial trial with the customer as the final judge. It is not enough to have mastered the established techniques of today – ICI as a world leader must also be prepared for the distribution possibilities of tomorrow.



Eric Sharp of ICI Fibres Limited



Photograph: Chris Morris

A Director of Marketing of ICI Fibres Ltd. since 1965 and a member of their Board since January 1967, Eric Sharp graduated from the London School of Economics with honours in statistics. During the war he served as a staff captain. On leaving the Army in 1946 he joined the Board of Trade and later the Ministry of Power, where he was deeply involved with the problems of a major industry. As a UK delegate to OEEC, he was concerned in planning the European refinery programme. Later he became vice-chairman, OEEC electricity committee, and was secretary to the Herbert Committee on the Electricity Supply Industry, the first major enquiry into the efficiency of nationalised industry. There he met Mr. F. C. Bagnall (now Commercial and Financial Director, ICI, then Managing Director of British Nylon Spinners), who invited him to join BNS

'I know no other industry where the raw material producer is so deeply involved with every subsequent stage in the use of his material, from polymer right through to the final purchaser.' As the Director of Marketing at ICI Fibres who looks after sales and merchandising to apparel markets in the UK, Eric Sharp has lived with their problems since 1957. Because the words 'customer,' 'market' and, above all, 'competition' all have very special meanings in his industry, we began by asking him just who his customers were – and got an answer recalling the house that Jack built:

Customers' customers' customers

'We are concerned not only with our own direct customers but also with their customers – even with our customers' customers' customers. We not only make and sell synthetic fibres; we help our customers to sell what they have made with *our* fibres to *their* customers.

'So for us the word "customer" has at least half a dozen meanings. A spinning-mill owner who orders 'Terylene' fibre in quantities ranging from a few thousand pounds to many millions is a "primary" customer. But why does he order this particular type of fibre? Because one of his weaver customers wants to make fabric from it. So who is our customer – this weaver, or the multiple tailor who is asking the weaver for 'Terylene' cloth to make up into suits?

'It's the same with 'Crimplene.' Is our customer the 'Crimplene' licensee who buys our "flat" yarn and processes it into bulked polyester? Or the knitter who knits 'Crimplene' into jersey fabric? Or the maker-up who demands 'Crimplene' for his garments? Or the store where 'Crimplene' dresses, coats and suits are displayed and sold?

'Spinners, processors, weavers, warp-knitters, weft-knitters, hosiery manufacturers, makers-up, retail outlets – over 75,000 of these – retail chains, multiple clothiers, mail order firms – and the shopping public: they are all our customers – the primary ones numbered in thousands but the final ones in millions. Our job is to cope with their very different needs, all at the same time.

Sensitive demand

'Our special problem is that we have to make people want our particular products. A suit doesn't have to be made with 'Terylene,' a shirt in 'Bri-Nylon' or a dress in 'Crimplene' – there are always competitive substitutes. We have to

make sure that the form in which our materials appear in the shops – the way the clothes look and feel – is more attractive than in other fibres.'

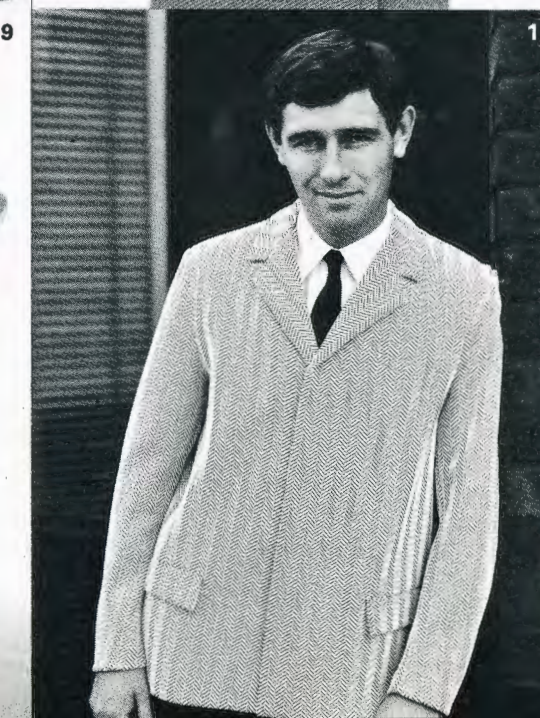
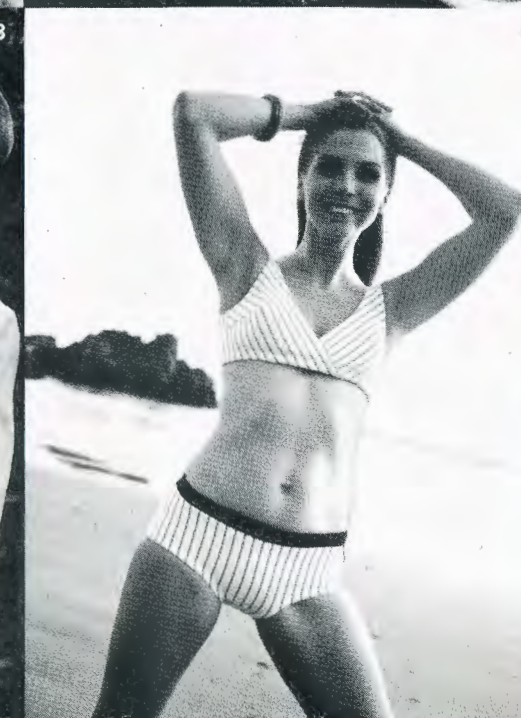
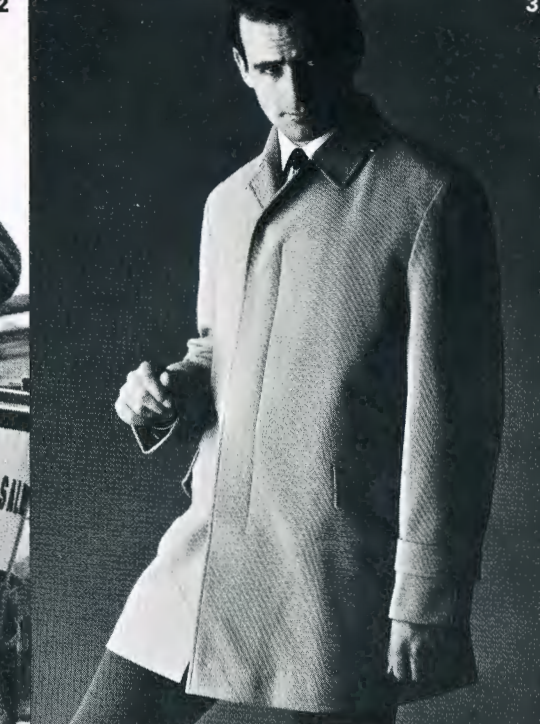
With so varied a customer pattern, market research and demand forecasting call for swift, sensitive assessment of several distinct trends: 'Through the regular contacts maintained by our trade managers and sales representatives with primary customers we try to pinpoint what profit we can expect by detecting shifts in the prices our customers are prepared to pay, or shifts in demand for our products. We also keep contact with customers at the other end of our scale through a monthly consumer buying survey. Questions cover about sixty garments, asking people what they've added to their wardrobe, where they bought it, what type they bought, and how much they paid. From this collection of data we have built up a significant index to the pattern of consumer demand and textile distribution.'

The most difficult task is forecasting: 'Predicting trends in the market for synthetic fibres is rather like predicting the weather,' says Eric Sharp. 'We know a lot more than we did about both the short- and the long-term meteorological factors concerned, but something can come along quite suddenly to throw the forecast out – which teaches a certain humility! Estimating textile demand is no less difficult.'

His number one priority is to watch all market trends affecting the position of ICI Fibres or their customers: 'And I don't mean just the big customers, either. I mean significant. Some customers are much more sensitive to market trends or competitive fibres than others. If you become insensitive to these individual leaders you could stumble into a

CUSTOMERS ALL

1. Hand-knitted dress in Bristol 'Bri-Nylon' knitting yarn
2. Sailing smock and overtrousers by Jalite in proofed 'Bri-Nylon'
3. Topcoat from the Guards range by S. Schneiders & Son in 'Crimplene'
4. Children's 'Bri-Nylon' raincoats and sou'westers by Chilprufe
5. Shirt by Peter England in 'Bri-Nylon' and tie, by Grenville, in 'Terylene'
6. Stockings by Wolsey in 'Tendrelle'
7. Women's suit in 'Crimplene' jersey by Nina Ricci of Paris
8. Boy's suit by Mark One in 'Terylene' / wool worsted
9. Swimsuit in 'Bri-Nylon' stretch jersey from Scotch Wool Shops
10. Men's casual jacket in 'Crimplene' by Reff Leisurewear



major crisis before you knew where you were – a crisis spelling loss of markets or loss of profitability.'

Marketing methods

While the vital need is to see that the right goods are available, and *known to be so*, in the right places at the right time, methods of operation naturally vary according to the development stage of the end-product. With a new yarn such as 'Tendrelle,' already known to be 'right' in a technical sense and used only for one purpose, marketing activities concentrate on the straightforward promotion of 'Tendrelle' stockings to the public, through press and TV advertising and retail store displays.

With other new yarns, however, the job is more complicated. For example, ICI Fibres can now offer a wide range of nylon yarns with differential dyeing qualities, producing as many as five different colours from one dyebath. Technologically interesting, but will they prove attractive? So the colouring and fashion resources of the design studio are used to produce a range of sample garments in these yarns which will have fashion appeal as well as technological excellence. These are shown, in mini-fashion parades, to knit-wear manufacturers in important textile centres where ICI Fibres have sales offices which link *direct* selling with promotion for the future.

The current widening of the scope of 'Crimplene' is an encouraging example of a successful combination of technical development and merchandise promotion. 'Here we have a strong trade-mark situation, where our licensees are now reaping the reward of their initial confidence. People like 'Crimplene'; we want them to go on liking it. So the range of weights, textures and finishes has been widened from the original raised-surface fabrics to include all types of women's outerwear, from blouses to coats, a variety of children's clothes and, most recently, men's wear.'

Complex competition

The complex structure of international textile trade makes synthetic fibres one of the most complicated industries in

which to construct a rational commercial policy. 'We're not only exposed to competition at the yarn stage, both from domestic as well as foreign competitors,' Sharp emphasises. 'Our customers are competing, too, at various stages of the cycle, whether in processed yarns, fabrics or garments. You may find that yarn we are selling in one country is processed in a second, made up in a third, and then comes back into the UK to compete with our own finished products.' Tariff walls in North America and Europe; differential pricing in overseas markets to meet international competition; the problems of EFTA on one hand, the Common Market on the other; the Anglo-Irish treaty – all these produce extremely difficult commercial problems.



Through the development of EFTA, for example, the low-cost textile industry in Portugal has been able to compete more effectively with the UK textile industry. In Scandinavia, where no basic synthetic fibre production exists, foreign fibre-producers compete at prices lower than in home markets. The resulting fabrics or garments can come into the UK duty-free because of EFTA rules of origin. Competition from Hong Kong and Japan on price is also very keen. Above all, ICI's customers face the highly-efficient, large-scale textile manufacturers of the USA, who operate in a huge domestic market – if there is any recession in the States, they can spill enormous quantities of fabrics overseas.

What will the future bring? Clearly, marked changes and international opportunities for ICI Fibres. 'Although we are already a major international producer, linked through associated companies with the USA and Europe as well as Australasia, South Africa and India, we cannot yet say that we deploy our technical and marketing resources internationally as effectively as some of our most significant competitors do.'

The impact of the Common Market, Eric Sharp feels, will force many producers to match their internal economies of scale (in research and development as well as in production) much more closely with the needs and opportunities of the market. 'Against a wider economic market in Europe, with the removal of tariffs we shall see an increasing flow of yarn and fibre at various stages of manufacture. This will lead to greater uniformity of prices in fabrics as well as fibres. Economic trends will bring greater industrial concentration of skills and resources. I see new "Euro-industries" emerging; industries joining forces, not necessarily in terms of company mergers as a whole, but to secure economies in the marketing as well as the research and development costs of similar products.'

The retail end of the trade is changing fundamentally too, he stresses. Textile requirements are becoming more and more streamlined. Concentration of purchasing power through chain stores or mail order houses is bound to affect the fibre producer. Another key agent of change is the rise of new spenders in different economic and social groups. More and more, fashion is created by young ideas penetrating upwards.

More generally, the increased leisure of more developed communities is reflected in fashion changes. Central heating in the home and heated motor-cars both encourage more use by men and women of casual, lightweight clothes. There will be brighter colours still, possibly new materials. There may even be special clothing developed which neutralises variations in temperature: clearly developments in disposable garments will quicken. There will also be fundamental changes in fabric technology involving producers and customers alike in novel methods of textile production. One thing is certain. The marketing of man-made fibres for the textile industry will not become any simpler than it is today. But it will never become predictable, monotonous or dull.

a wildness of orchids

The word 'orchid' has always had an exotic sound. A few readers may already know a little about the existence of the British wild orchids. Others may be surprised to learn of it for the first time. More than forty different kinds of wild orchid can be found in the British Isles. Nigel Cattlin, who runs the research photographic unit at PPL's Jealott's Hill establishment, has studied these strange plants as a hobby for over ten years. Here he describes his impressions of wild orchids he has seen and photographed in various parts of the country. Below: a Pyramidal orchid, a fairly common species peculiar to chalk downland.



conditions must be right. Most interesting of all, certain types of microscopic fungi known as *mycorrhiza* must be present. These are small organisms which live on plants, either inside the actual cells or outside the plant, but

and the Early Spider orchid. The Bee orchid is still found quite extensively in the chalk downlands, but the Early Spider orchid, much rarer, is confined to relatively few areas of chalk and limestone in the south, mostly in Kent and Dorset. With a few comparatively large florets on each spike, and looking more like their tropical relatives, these are among the most attractive of British orchids.

Plants like the extremely rare Monkey orchid are now found in only two places in Britain: east Kent and southern Oxfordshire. A single plant, rediscovered in Kent some ten years ago after years of apparent extinction, has now, through careful protection and artificial pollination, produced a colony of nearly 300 spikes (flowering plants). This triumph of conservation has enabled new colonies to be established.

The Autumn Ladies' Tresses, an enchanting little plant barely four inches high, from another group, has a spike of small florets which spiral round the stem. It prefers coastal zones but is also found on short turf inland. The one illustrated in this article was photographed between the gravestones of a cemetery in west Kent, while another one survived until recently on the lawns of the Cottage Hospital at Tonbridge. It could also pop up on your lawn!

My own interest in these plants was aroused 10 years ago when I was out walking in the countryside near Tonbridge with my father, who has always had an interest in botany and the natural sciences. Within a few months we discovered two wild plants which we were unable to recognise but which were distinctly different from the ordinary plants of the wayside. By looking up

botanical works in our local library at Tonbridge we identified them as the Broad-leaved Helleborine and the Greater Butterfly orchid. According to the books, these were only two of the large number of British wild orchid species—and up to thirty of these could be found in our home county, Kent.

Our interest whetted, we consulted the natural history assistant at Maidstone Museum, who put us in touch with the eminent botanist Dr. Francis Rose. Helped and encouraged by him from then onwards, we had traced and seen for ourselves, before many years elapsed, all thirty of the native Kent species, among which are some of the rarest varieties in the British Isles. My father and I each had our own means of recording these plants. I would use a drawing-pad, while he used to disappear under a large black cloth with an aged plate camera, much to the amusement of anyone who happened to be watching. From my sketches I would produce detailed drawings later, of which I was very proud, but after a while I found this too laborious and I turned to photography myself. As the picture on this page shows (myself so interested that I didn't notice a horse eating my shirt), the study of orchids can be all-absorbing!

As time went by we developed an informed sense of where the orchids might be found, and soon began to discover new colonies of our own. One was in a field not far from Tonbridge, a field with a soil character right out of context with the area, because it was bathed by an alkaline stream from the North Downs, while the local soil was sandy and inclined to be acid. There we found a fine colony of Marsh orchids, Common Spotted



Autumn Ladies' Tresses



Bird's-nest orchid

orchids, and all the hybrids which occur between the two of them. Also in the field was a colony of the Green-winged orchid, a new locality for this species.

From my earliest days in this hobby I was always intrigued by those plants, which, like fungi, obtain all their food from the soil and do not need chlorophyll (the green colouring matter in most plants) to help them in producing starch and sugar. This group of plants are either flesh-coloured or various shades of brown. Not needing light for their life processes, they often grow in the darkness of the densest woods. Three British orchids belong to this group, among them the Bird's-nest orchid, so named from its bushy root structure. Like others of its kind, it gets its food from the dead organic materials of the woodland 'floor.' These plants are never green, while their leaves, no longer essential for food production, are often diminutive or non-existent.

Another member of this group, the Ghost orchid, one of the rarest in Britain, is a small plant, off-white in colour and almost transparent, with pink-tinged flowers. It has been so named from its ethereal appearance and its capricious flowering habits in the very depths of beech woods. It flowers only once or twice in a decade, and since it needs no light has been known to flower *below* the level of the mould in which it grows.

The study of wild orchids in Britain is both fascinating and rewarding. I once

cycled 120 miles in all on a hot summer's day to see the legendary Lizard orchid over in east Kent. This quaint plant, with its odour of goat, has captured the imagination of the public more than any other orchid: its unpredictable appearance in new places from time to time always seems to hit the headlines.

Those who want to know more about these strange and often hauntingly beautiful plants should read *The Wild Orchids of Britain* by V. S. Summerhayes (Keeper of the Orchid House at Kew) in the Collins New Naturalist series, a magnificently-illustrated book which first put my father and me on the trail which has given us so much enjoyment.



Green-winged orchid



Early Purple orchid

In flower structure, the British orchid is identical with its foreign relatives. As in all the orchid family, the leaves, like those of grasses and lilies, are parallel-veined (running parallel along the leaf from tip to base) and not networked as in so many flowering plants. While the largest native specimens look small beside the foreign ones seen in the florist's window, to those who have studied them they hold the same quaint and fascinating charm as the first orchids brought back by early explorers from the basin of the Amazon.

The life history of the orchid, its growth, means of pollination and propagation, its capriciousness in flowering—all these add to the mystique around its name and explain the special interest aroused both in nature-lovers and in the general public.

They are perennials, that is, plants which persist from year to year (though not necessarily flowering every year), and they grow from microscopic seeds, many thousands of which are produced by each flower. But because they flourish in so few places and have several natural enemies (such as rabbits, birds or farm animals), very few of these seeds survive. Wild orchids are also easily destroyed by bigger neighbouring plants.

If an orchid seed is to flower, many things need to happen, and in a certain pattern. The soil on which the seed comes to rest must contain a correct balance of essential elements, and moisture and light

supplying to the host (through their roots) essential materials. Orchids store in their roots a starchy material which being insoluble cannot be moved to other parts of the plant. The mycorrhiza are able to break this down into a soluble sugar. They live in association with the germinating orchid seed, one gaining from the other substances that each alone cannot produce. This strange marriage is called symbiosis.

The orchid family subdivides into several groups, each with its own basic characteristics. Largest and best known is the *orchis* proper, which contains some of the commonest and the rarest examples. The Common Spotted orchid is a typical example. Found in the woods and fields on a wide variety of soils, it blossoms in June and is probably the best-known of the native species. It varies in height from nine to fifteen inches and has four or five dark-spotted leaves round its base. Each flower head carries a spike of small florets (individual small flowers forming part of a larger whole), ranging from pure white to pale mauve, with distinctive magenta markings on the lip (the largest petal) which vary from plant to plant. The Green-winged or Green-veined orchid, another member of this group, is so named from the green veins on the wings of this otherwise pink or magenta flower.

Many orchids look like animals or insects and have been named accordingly. Two examples are the Bee orchid

Common Spotted orchid



Early Spider orchid



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The Bee Orchid, one of more than forty orchids native to the British Isles. Among the most attractive of British orchids, it is still found quite extensively on chalk downlands

Photograph: Nigel Cattlin

